MEDICAL AND PHILOSOPHICAL

REGISTER.

VOL. VI.....No. IV.

FOREIGN AND DOMESTIC.

Thoughts on the Expediency of Disclosing the Processes of Manufactories; being the Substance of two Papers lately read before the Literary and Philosophical Society of Newcastle upon Tyne. By JOHN CLENNELL, *F. S. A. Edinburgh and Perth.*

PART II.

Philosophy will then attain to perfection, when the mechanic labourers shall have philosophical heads, or the philosophers shall have mechanical hands.

Bishop Spratt's Hist. of the Royal Society, 4th Edition, page 397.

(Continued from page [129.])

IN the former part we have taken a view, however confined and imperfect, of the consequence of adopting mystery in manufactures and in the arts, elucidated by the influence it formerly had on the sciences; and it was likewise attempted to be proved, from the consequences of the spirit of research, by which these sciences have been enabled to make so rapid a progress, that similar efforts, introduced into the arts and manufactures, would have similar effects: the facts in these views

were meant not only to strengthen or confirm the proposition, but also, reasoning from experience alone, it was supposed, that the charge of being visionary or merely theoretical could scarcely be attached. The improvements in manufactories, which we may flatter ourselves might be adopted, in consequence of disclosure, must be expected, however remotely, from the once slowly progressive, but now highly accelerated, advances which the sciences have experienced in late years; an acceleration which it is most ardently hoped will continually increase, and be bounded only by the existence of man upon this globe!

In ancient times, to conceal these sciences from general diffusion, much more secresy, much more artifice, were practised than are even now used to circumscribe the progressive or scientific improvement of manufactories; it is well known that the initiated were formerly partakers of knowledge under the most tremendous oaths of secrecy; the terrors of confiscation of property, of loss of cast, disgrace of family, and assassination, hedged around the little that was known, and confined it to a chosen few, whose leading principle was not the dissemination of knowledge for public good, but its private cultivation for increasing their powers of tyranny and controul.

Astronomy and chemistry were introduced as affording examples of the destructive effects of ignorance in astrology and alchemy; I could have instanced, in its improvements by science, the progress of navigation; the difficulty is not in mentioning those that are benefited, but in finding one deteriorated by examination or even disclosure: in manufactures too, as I before hinted, who is it but sees and feels the advantages of the introduction of those engines we already have? but how slow would have been their improvement had not communication assisted the engineer!

In the progress of my inquiries, I have been fortunate enough to meet with some more objections to the principle of disclosure, which I shall now notice, and give such replies to, as I presume will be thought sufficient; to these I will add some observations in support of my opinion, and shall think my efforts fortunate, if they are honoured with the attention of the public. I have been told that even the journeymen have secrets in the parts of the business they practise, which the masters, however anxious to do so, cannot discover, and which the journeymen tenaciously keep from them; consequently, that if the masters were convinced of the advantages of contributing towards that general stock of information I propose, or even possessed a clear knowledge of their business, still a mass of little operations, undigested indeed and irregular, yet most useful in each branch, would continue undiscovered. This however is not so much an objection against the propriety of giving information, as it is a statement of the difficulty in procuring it: but allowing its validity as an objection, it might be replied, first, that they will be developed, with or without the consent of the workmen, by that very intimate knowledge of the nature of each article employed, its mode of operation, its connection with, and influence upon, others used in the same fabric, the different effects of hard and soft water, of length of boiling, of the degree of heat continued or lessened, length of maceration, of the effects of slight variations in the dyeing mixtures, or those of the introduction of very common articles to them apparently unconnected with that art, and a variety of other things, in the very minutiæ of the manipulations, in which it is more than probable the whole secrets of the journeymen may consist. All these an improved chemistry, directed to a complete knowledge of the materials used in his business, must open to the master manufacturer; and as a valuable addition to the advantages of more easily acquiring that sort of information, the use of the micro-

scope might be added in examining the filaments, and their various dispositions, in the linen, woollen, silk, and cotton manufactories, in every different department of the work; and indeed at intervals, in its progress through each stage, this instrument is now used for detecting imperfections in linen, muslin, &c. which, we find from St. Fond, was carried by him into France*; with these means well employed, it is perhaps no great boldness to predict, that any object of advantage, in the possession of the journeymen alone, at present, may be discovered, and that without their assistance: but do these men possess the *ne plus ultra* of our present improvements? or will not rather one fact added to another smooth the progress of the inquirer to the discovery of a third, and finally be like the operation of the wedge in mechanics?

In another view, many facts in one business may illustrate many in another: thus, the wauking or milling of cloth, or of Scots bonnets, is only the felting in hat-making on a larger scale; the shrinking up of woollen stockings in washing is effected by the same principle. The joiner, the ship-carpenter, the gardener, and the tree-planter, may afford a few data, valuable to each other. And the clothier, the hatter, and the worsted-stocking weaver, may contribute each a portion of information in his own business to the wool farmer; thus, if the hatters have some ideas on the nature of felting, which they will not discover, the others may be willing to communicate them: but this subject is already made public by Cit. Monge.

Again: this class of society is not free from the operation of bribes; they may be used as a master-key to unlock their tongues, and make them unriddle their mysteries: it is also to be recollected, that many things in their hands, when discover-

* See his Travels in England and Scotland, vol. ii. page 184.

ed, either have been known as well before, or have not been worth the trouble employed in obtaining the knowledge of them; though concealed, as in a higher circle, by cant terms, mysterious looks, and a vain and empty, though sometimes imposing, confidence.

Again: improve the understandings of these men, show them it is their interest to give, that they may receive; to communicate, that they may obtain communications in their turn: but an answer to any objection of this nature is anticipated in an observation of Mr. Boyle, as quoted by Dr. Johnson, in the beginning of the 201st number of the Rambler: "The excellency of manufactories and the facility of labour would be much promoted, if the various expedients and contrivances which lie concealed in private hands, were, by reciprocal communications, made generally known; for there are few operations that are not performed by one or another, with some peculiar advantages, which, though singly of little importance, would, by conjunction and concurrence, open new inlets to knowledge, and give new powers to diligence!"

As another reply, it may be observed, that those men will doubtless teach their children any useful secrets they may possess: if you cannot convince the old people, the chance, from the spread of education and liberality amongst the lower ranks, is more in favour of communication from the young; and we may, without any imputation of visionary extravagance, at least presume, that the chance for their making disclosures, if they possess any thing deserving the title of disclosure, increases, and will increase, every generation.

Labitur et labetur in omne volubilis ævum. HOR.

And thus may education, by giving, through the media of Sunday schools, a bias towards liberality to even the lowest

classes of the community, by that mean alone repay the time, trouble, and expence of subscribers, &c. to such institutions. But do the journeymen really possess secrets worth knowing, and should the above modes fail to insure their discovery, more than two ways yet remain to unlock the treasure: wind into their good opinions, obtain their favour and confidence by gentleness and kindness; few can withstand the operations of beneficence: should they be proof against these means, there is still left the pick-lock of the human heart: apply to their ruling passion, work upon it for the purpose of discovery, and all the obstacles will melt away like snow exposed to a meridian sun; in fine, every method should be applied short of evil "that good may come."

As a reply within the compass of the present time, and what is beyond a doubt sanctioned by experience, it may be urged, that journeymen are always floating, as it were, from one shop to another, and thus, as the winds bear about with them, and scatter the seeds of many plants, into distant soils, so do these men convey the discoveries of more advantageous combinations, or mechanical operations, into other work-shops; the more there are acquainted with such improved methods, the greater probability of their final and complete display. Under the class of replies, which the objection, if it may be called one, that we are at present combating, has suggested, may be placed another, which though at first sight may seem of little weight, yet I confess it appears to me, from circumstances that I have known in different parts of the country, to be of very great influence in spreading information; the quartering of militia regiments: the privates are, in manufacturing counties, taken from the loom, the bench, the plank, and in fact from every operation of the arts; numbers of these obtain leave, or find opportunities, to work at their trades where their regiment is quar-

tered; and in many instances, for very slight considerations, have been known to discover the superior methods of their counties to masters and men indiscriminately in others. Will it be thought empirical in the writer of this, if he takes the liberty of quoting a circumstance in the history of the manufactory he is engaged in, of the introduction and present diffusion of an article in it, which not only gives a perfect illustration of the principle attempted to be established, the beneficial effects of science on the articles employed in manufactures, in consequence of their being submitted to the inquiries and experiments of the philosopher and chemist, but also of the particular reasoning at present under review, that journeymen, by their working in different shops, distribute their information to each, and indeed that they are by no means so tenacious of any improvement they may possess, as is generally represented. The superior effects of the oil of vitriol (sulphuric acid) to the dregs of porter, ale, &c. without such an addition, in working stuff-hats, was discovered in France by one of her chemists: of its peculiar advantage in hat-making we shall see below; its discovery in that country was the mean of obtaining a generally better character for the French hats in foreign markets. Amongst the English prisoners, during what is generally called the Spanish war, there was one who had been a journeyman hatter, who, during his captivity, frequented, whenever he could, the shops of hat-makers which were in the neighbourhood of his prison: his curiosity was awakened by the introduction of a liquid, in addition to a very materially decreased use of dregs, which he had never before seen applied: by degrees and inquiry, he discovered what it was; its great utility consisted in making that part of the rabbit and hare's wool useful, which was thrown away before its adoption; and giving, in fact, an additional value to the whole of the materials employed in making the hats. On his return home, he sold this almost invaluable discovery for a few flaggons of beer, or a very

slight pecuniary recompence, to different shops full of men, all of whom were anxious to obtain the knowledge he had gained, and these communicated it to their fellow-journeymen and their masters, on as easy or even easier terms: and when it is considered that he was of a peculiarly wandering and unsettled disposition, much more so than that class of men generally are, and they are almost proverbially so, it may easily be concluded, that this very great improvement, discovered originally by a French chemist, was soon disseminated round this kingdom.

Another instance of the beneficial interference of science upon the objects of manufactures, will be found in the life of Michael Adanson, lately published. "His researches led him to the discovery of the two genuine Arabic gums, and, after numerous experiments, he succeeded in extracting from the indigenous indigo plants of Senegal, which differ from the American, a sky-blue colour, a valuable discovery, that had escaped the most expert indigo manufacturers, which the French East India company had sent at different times to Senegal*."

The manufacture of sal-ammoniac was first introduced into Edinburgh, and from thence probably into the united kingdom, by a wandering German, known there by the name of "Sooty," whose pretensions to the secret were examined, and afterwards supported, by the late Dr. Hutton, of that city; the work was consequently established in its neighbourhood, and is the largest perhaps in the kingdom. Are we licensed to say that these are the only advantages either taken from neighbouring nations, or imparted by one workman to the country at large? Even in this town or neighbourhood, in the glass-works, the families of the Henzells and the Tyzacks, if not the Titterys, who

* See particularly in the Traveller of Jan. 29, 1807.

from being extinct are of necessity silent, could declare the impotence of such an assertion: in fact, it is not improbable, but every English manufactory has obligations either to France, Flanders, Spain, Germany, and Holland, or some other of its European neighbours, not merely for many of its improvements, but in a great measure for its very origin.

There are many other instances which might be given of the genuine and beneficial effects of carrying our principle into action; but it must be confessd, that the generality of master manufacturers act, as if they were afraid of the fate of sir Thomas Chaloner, who was excommunicated by the then reigning pope, for erecting the first alum-works in England, at Whitby. Something similar to this terror actuates the minds of most of the journeymen hatters, who dare not deviate from the beaten track, for fear of being made "foul;" in other words, excommunicated.

But well would it have been for the manufacturing interest of this country, had that antipathy towards discovery been confined to journeymen! masters of considerable eminence, nay, the whole, with a very few exceptions, are as much wedded to mystery, as those they employ.

On this part of our subject we may conclude with the Rev. Robert Barrows, in the preface to the first volume of the Transactions of the Royal Irish Academy: "How far experimental science may assist the commercial interests of a state, is clearly evinced, by the success of those several manufactures, in the neighbouring countries of England and France; where the hand of the artificer has taken its direction from the philosopher. Every manufacture is in reality but a chemical process, and the

machinery requisite for carrying it on, but the right application of certain propositions in rational mechanics."

Should there be any who are satisfied in the objection to the principle it is the object of the present pages to defend, that it is visionary, one short reply is sufficient: every good yet proposed, every improvement yet suggested, have, at the period of their first promulgation, received that title; but those who are either to be deterred by such a bugbear, or who join in the cry, may themselves have a better claim to receive, and to retain the epithet, the one party for suggesting what a laugh incapacitates them to defend, the other for attempting to foil endeavours for the benefit of our fellow-beings.

But in the language of a very estimable philosopher of the present day, "Laughter is said to be one of the distinctive characters of the human species, and our pleasures are not so many, that we should neglect any innocent source of amusement. No serious evil is to be apprehended from raillery, especially if attended with good nature; Herschell will not be diverted from pursuing his discoveries, because the inhabitants of Laputa give themselves too much anxiety about the sun's good health." Nor sir Joseph Banks from the study of entomology, by the playful Peter Pindar. "Let the man of wit," continues that respectable author, "enjoy his joke, and the man of experiment, his rational toys, provided both unite in cultivating that amiable spirit of philanthropy, on which the happiness of social intercourse so much depends*."

If, however, the scheme is considered as visionary, the author finds that he will not have to bear that accusation alone.

* Nicholson's Journal, Vol. I. 8vo. series, page 150.

Bishop Spratt, in his history of the Royal Society, page 310, of the 4th edition, has the following remarkable expressions, in relating the progress which that society had then made.

" In composing histories after this manner, they resolve to proceed, till they have not only obtained an account of all the great and most substantial trades, but also of all the less works, and private productions, which are confined to some particular soils, or corporations, or families. As this stock shall increase, they purpose to make it of general use, either by continuing printing the most remarkable of them, or by freely exposing them to the view of all that desire such informations; provided, that at the same time they receive some, they will also communicate others: and they have assured grounds of confidence, that when this attempt shall be completed, it will be found to bring innumerable benefits to all practical arts. When all the secrets of manufactures shall be discovered, their materials described, their instruments figured, their products represented, it will soon be determined, how far they themselves may be promoted, and what new consequences may thence be deduced. Hereby we shall see whether all the parts of the most obvious crafts have been brought to perfection; and whether they may not assist each other, more than has been hitherto endeavoured; hereby we shall discern the compass, the power, the changes, the degrees, the ages of them all; and speedily understand, whether their effects have been large enough, and the ways of producing them sufficiently compendious. In short, by this help the worst artificers will be well instructed, by considering the methods and tools of the best: and the greatest inventors will be exceedingly enlightened; because they will have in their view the labours of many men, many places, and many times, wherewith to compare their own. This is the surest and most effectual means to enlarge the inventions: whose nature is

such, that it is apt to increase, not only by men's beholding the works of greater, but of equal, nay, of less wits than themselves."

If then the principle is visionary, with such as this good ecclesiastical visionary would I live, with such would I die.

An objection of nearly the same nature as the last we noticed, is that of an individual "teaching every body his business," and the conclusions, much in the spirit of ridicule, drawn from such: but it ought to be observed, that if every, or even if any, manufactory is unmasked, the more that know them, the better chance for improvement; a variety of new and rational combinations may be suggested, some of which, if not the most, may lead on to incalculable benefit: again, if every person was acquainted, I will add intimately acquainted, with every manufactory, one great source of imposition would cease; and will any one strictly of integrity, ridicule or trammel a plan, that shall do away, even in part, so great an evil?

I have been asked, Do I think it probable that a person who may have purchased, perhaps at a high price, an improved method of some process, would publish the secret, merely from what may be called a motive of liberality? This is not often the case; nor does it appear to bear in the least upon the object recommended; it is condemning the cause of a good system, from the effect of a bad one: the one case is an individual making private property of, and selling to another, who wishes to make it equally as beneficial and equally as sacred, the manner of a certain process which he has had the good fortune to improve: the other, is the public purchasing any improved method of an individual for the public good. But it is confounding the terms to unite in so intimate a manner the ideas of public or general

good, and disclosure: general good, which necessarily includes that of the individual who communicates, would be the result, it must be obvious that it is not the direct motive: complete remuneration to the individual for complete disclosure is the object meant to be illustrated and meant to be enforced; but, as in the cases of Wedgewood, Simpson, and Dawson, mentioned before at pages [126], [127], we see some of the most respectable men publishing their discoveries (originating in persevering ingenuity), and that from a motive of liberality alone: are there no others to be met with? or must the virtuous actions of these men be branded with the charge of imbecility?

It is urged "that other manufacturers in this country would reap the advantages of their more ingenious neighbours; and consequently that the profit of improvements would be snatched from the original discoverers." But barely to mention, that this is already answered above in the quotation from Mr. Boyle, page [141], or that improvements had better never be effected, lest their advantages should extend beyond the first inventor; "the most sacred and unalienable property," it is added, "is certainly that of a man's ingenuity, and in discovering his inventions, the only return, on the principle contended for, appears to be merely fame, if even that: ought not improvements therefore to be the property of the first inventor?" Such is an objection that has very frequently occurred, and it must be allowed is of very considerable weight; particularly so, if the principle in reality condemned a direct remuneration. But besides what might be termed the remote advantage, remuneration would follow immediately and of course; the same principle that induced individuals to discover their improvements, would form societies for purchasing them, as formerly, if not now, in France, for the good of the public; or rewarding them, as in many instances of the present day is the boast of

Britons; in which case they are a property of their inventors, and I only wish to show the impropriety of their being exclusively so after a proper remuneration is received.

Nothing, in the view of the author, can be more sacred than the right each individual has to the profits of his knowledge, ingenuity, or experience; a course therefore that shall unite not only the remote profit of the discoverer of valuable improvements, but also remunerate him immediately, is that which I have endeavoured throughout to recommend; a plan in which right and duty are so intimately united, that philosophical inquirers might still further advance such discoveries, and that individuals might not lose any thing of their just rights.

It might therefore be recommended to government to give a premium, instead of granting patents, for the promulgation of any discovery; or, if patents are easier given than premiums, that the patentee shall be bound to disclose the whole secret at the expiration of the patent.

But, "government may not be able duly to appreciate the value of each discovery, and consequently may reward some insignificant inventions profusely, and some peculiarly beneficial ones with a very trifling remuneration:" this may be obviated in a considerable degree by an association or board of ingenious men, chemists, agriculturists, engineers, and manufacturers, in each county of the united kingdom, through which a communication or correspondence might be established with a similar association in London, consisting of men whose talents and ingenuity are acknowledged; the claims to be examined and adjusted by the board where the discovery is made, and the London association, in conjunction with every other, to give their remarks on its utility, further simplification, and improve-

ment; all these again to assist in the general circulation and publication of the process, and to procure a still further reward to the inventor, in proportion as the utility of the discovery became apparent.

The following might assist in some degree in determining the meaning of the word discovery, in the intercourses of such a connection, as much would depend on its fixed interpretation: each branch or board to enrol all the processes practised at present in England; and whatever is added afterwards, whether by masters or journeymen (for each should be solicited to communicate), ought to be considered as a discovery, and value given for it according to its importance. A fund might be formed by donations, subscriptions, or any other mode of that kind thought most effective, and also from the profit of the publications of the united societies, and the inventions they have patronized, every three, six, or twelve months: thus the inventor would not only receive his reward at once, and without the misery of toiling for it through years, when it might be at best only problematical, but by the reward being instantaneous and sure, it may excite to inventions, which might never otherwise have been accomplished.

An objection, apparently forcible also, but closely allied to the foregoing, has been used to prevent any further display,

"To blast the fruits of knowledge in the bud,"

"that manufacturers in other countries, where wages may be lower than this, and who even now are using their endeavours to rival us, would then have their most ardent wishes completely fulfilled; and that we should in that instance be supplying a weapon for our own destruction." An argument of the same

nature was used by the opposers of the abolition of the slave-trade: dismiss your slaves, said they, and the trade is open to every country of Europe: so here, dismiss your mysteries, and your rivals profit by it. But if the argument runs so parallel, and as the slave-trade has been proved to be unjust and impolitic, the inference is as regular that the continuance of mystery in manufactories is equally so: but as a case exactly in point with the principle contended for, I would ask, is printing less lucrative, or injured as a trade, by Luckomb's publication of its history and of its rationale?

To reply to these gentlemen on their own ground, what country, except our own, do we benefit by it? Is it Germany? is it France? but France and Germany have their Encyclopædias of arts and manufactories, and have we benefited by them? If we have, shall Great Britain be arraigned before the nations of the world with the charge of ingratitude or selfishness? If we have not, may this not also be the effect of such a work published in England? But this objection, as I before observed, is nothing more than the former one in a more expanded state, and involving as it were a more considerable portion of society; the reply to it therefore prepares in a great degree a refutation to this; in fact, they each of them resolve themselves into monopoly, and are consequently opposed by the same arguments; in addition to which, it may be observed, that as different counties or districts are differently situated, their attentions must of necessity be directed to various speculations: thus manufactures, rather than other objects of gain, will necessarily be cultivated by many; agriculture, in preference to manufactures, by others; and the reduction of ores by a third division; whilst one part of a nation shall derive their business from the export of coals, others will draw theirs from lime. To extend this view from one country, as united within itself by the natural produc-

tions of its various districts, to many, as bound together by their imports and exports; wine or spirits will obtain the almost exclusive attention of one kingdom, others will be the birth-places, as it were, of the more precious metals; here the climate only producing necessaries, there a superfluity of luxuries: thus Nature herself, independent of the arts and their most essential improvements, has laid the foundation of commerce in the exchange of her productions, and that not only in the same kingdom, but has formed a chain that ought to bind every nation of the globe to every other.

" Oh fortunatos nimium sua si bona norint
" Populos!"
" But war, horrid war,
" Dispeoples half the earth."

Supposing the whole civilized community possessed of a full knowledge of every advance in manufactories, nations of more ingenuity than others would again take the lead, still further advances would be effected through the whole range of time, of place, of circumstance; thus, arguing from what has been, we may safely assert that improvements have no limits, they always reap advantage from competition, and it would perhaps be a most difficult task to say to what country their present state is most indebted. It may not be uninteresting to mention here a curious circumstance which the author learnt from a gentleman of Leicester, that stocking weaving is said to have been invented by the Rev. Mr. Lee, of Cambridge, during the reign of queen Elizabeth, whose patronage he solicited; this being refused him, he went over to Rouen, in France, was countenanced by that government, whose manufactories he thus increased, and made a fortune to himself.

But indeed the objection which we are now combating is one which every manufacturer of every country might use; this

single consideration will justify the charge of its arising solely from the spirit of monopoly, and it appears to be one of its most depraved suggestions. Of one trade with which the writer is acquainted, the English journeymen will not now allow a Frenchman to work with them, nor will the French journeymen associate themselves with one of this country; the reason they each assign is exactly the same, and precisely in the spirit of the objection which we last noticed, lest either should obtain a further knowledge of the improvements of the other: but was the principle of universal disclosure fully acted upon, other countries would give us in their turn their manufactories, and we should also have the advantage of their ingenuity in assisting ours in a more rapid progress of improvement: and have we, seriously speaking, so far advanced our discoveries, that the knowledge of the whole world besides is of no importance to us?

But to descend from generals, and to produce an instance amongst many, and that no subordinate one, that we may have the opposing argument in its full strength: the cotton manufactory, I believe, is that of the improvements of which we are most jealous: but if for the injury or loss, shall we say, of one, and that no very healthy process, we gain many, or even a few, as before hinted, and these no way injurious, and perhaps equally as profitable, the result is certainly advantageous: to the maiming or probable loss of this, we may oppose the production of Spanish wool in our own country; and perhaps each nation of Europe has even now its favourite manufacture which might visit this kingdom, not driven by sanguinary persecution for religious or even political principles, but allured hither by the gentle and benign operations of knowledge and more liberal encouragement: even now we may discover the dawning of such a progress from the impotence of legal restraint; we have

seen the Spaniard has not been able to monopolize his breed of fine woolled sheep; the French and Italians have received encroachments on their method of rearing silk-worms, and manufacturing the produce of their labours; nor have our prohibitory laws completely frustrated the attempts to transplant machines, for the cotton and woollen manufactories, into foreign countries; what numbers have been shipped, under the concealment of night, in defiance of the risk of detection, of forfeiture, and of penalties! We may in this part also illustrate national by municipal jealousy: we are told that the first machines were obliged to be taken out of Manchester by night for Perth, and are now spreading over many parts of Scotland; yet no decrease of business is felt by the Manchester manufacturers from this circumstance. And indeed how much more cheering to humanity, and agreeable to the singleness and simplicity of virtue would it be, if the improvements of one nation, instead of being introduced into another by bribes or diplomatic intrigue, had been patronized and diffused under the mentally healthy auspices of general improvement, having for its foundation kindness to the whole human race!

A few observations on the consequence of the general adoption of the principle, and I have done.

The impertinence of journeymen, when they find that they are in any degree the superiors of their masters in a knowledge of their business (and, from this, the pliableness of many masters to their whims), would be quickly done away; their laws and combinations would be effectually broken through; the progress of this most desirable object would eventually be more auspicious and more speedily and completely effected, in consequence of the general diffusion of knowledge involving also the progress of that for which I plead, and by taking an increased

number of apprentices, whether from the different parishes or otherwise, rather than by parliamentary interference; though the last act of our legislative body against combinations is certainly a great bulwark to the masters, and, so long as the men can have legal redress, where necessary, for legal application, they are by no means sufferers.

On this head one great support of combinations, and which it might be humbly recommended to the legislature to abolish by every mean in its power, is a practice pursued in many trades, of journeymen, when "on tramp," being taken "upon turn;" that is, when they are wandering from place to place, most probably dismissed from their last masters for their own immorality or depraved behaviour, the journeymen in the same trades at the towns at which they may call, are obliged by their bye-laws to support them, to drink with them, and, if they do not find masters to employ them, to make a subscription among themselves, to set "the strangers" on their road; this by the bye is generally spent ere they part: the effect is, that many journeymen wish for the coming of a stranger, as an apology for their ramble: thus, in such instances, and in some trades, drunkenness, and every species of vice, are the consequences of "having a man upon turn;" but was the practice abolished by the interference of government, the effects on the trades where it is practised would be beneficial to an extensive amount.

It has been said, that the man who made two blades of corn grow where one only grew before, deserved the thanks of his country; and are no obligations due to him, who, by inquiry, perseverance, and communication, enlarges the usefulness of those articles already employed in manufactories; who brings

new materials into the market, and forces new subjects to pay their tribute of utility to the arts, and to mankind?

It is obvious that the Royal Society of London, that for the Improvement of Arts, Manufactures, and Commerce, and the Royal Institution, all look to the regular publication of manufactories as one source of their materials, and they have in one degree or another pressed this consideration on the minds of their subscribers. It is, notwithstanding this, curious to observe, that none of them have entered at large into the reasons for such a wish, nor have they in any peculiar manner attended to the objections against such proceedings: it is also singular, that nothing of the kind has as yet appeared amongst the productions of the Literary and Philosophical Society of Manchester. It has been the desire of the author of this to fill up the chasm occasioned by the above oversight. If his success has been equal to the newness of his subject, it will constitute a feeling which he will be proud to possess: if it has not, though he is himself a manufacturer, though his leisure is devoted to literary pursuits, two leading features in the formation of that character who may best defend the principle of general developement, he has yet to lament that he is not the man who is to effect so extensive a reform: his view in this light, if humiliating, is not unpleasing; he can even in that event attend to, and enjoy, the success of others.

One recommendation propositions of this nature indubitably possess: if objects are interesting in proportion to their magnitude, and if that importance is to be valued according to their influence on the interests of society, this under our consideration at present must insure attention, as it embraces the very means of existence of by far the greatest part of the population of the united kingdom!

To sum up what has been said in as few words as possible: manufacturers may be divided into three great classes; those who have no motive but mere indolence to prevent their communications; those possessing no secrets peculiarly profitable, but who assume a mysterious manner perhaps to conceal their ignorance of the business they are concerned in; and those who have processes which, whether from patent-rights, or other apparently strong motives, they are desirous of concealing. The first class——but I pass on to the second; for these it may be sufficient to reply to the objections generally urged against disclosure, which I have attempted to do in the foregoing considerations; and if any truth exists in what I have there stated, it will be readily granted me, that mystery, as it is the bane of private, so is it also the destruction of general improvement: and for the third class, a chamber or board of commerce, as suggested at page [150], might be established, to record and reward their labours.

To the real patriot, the friend of the prosperity of his country, the improvements adopted after a given number of years were elapsed, would form an interesting object of contemplation: each disclosure would be like a pharos or beacon, to direct other inquirers, like a terminus or land-mark, to show how far the former limits extended: man would not then be humiliated by retracing the steps of discovery, but improvement would proceed in an uninterrupted course, like those majestic rivers of America, which, receiving their supplies from innumerable lakes and mountains, increase with their progress, until they pour their full tribute into the Atlantic!

Method of preserving Fruit without Sugar, for House Use or Sea Stores. By Mr. Thomas Saddington*.

The expence of sugar is frequently urged as a reason for not preserving our English fruits, and to this may be added the uncertainty of success from the strong fermentable quality of many fruits. They may indeed be preserved for a length of time without sugar, by baking or boiling, and then closely stopping them up; but if the cork becomes dry, the atmospheric air exchanges place with what is impregnated by the fruit, which then soon becomes mouldy: but fruits may be preserved in good condition, by the following process, for two years, or even it is probable for a longer period, even in hot climates, as some that were done in 1806 have been exposed in an upper room to the sun during the whole of the summer without injury.

The fruit being clean picked, and not too ripe, is to be put into wine or porter bottles, as they are cheaper than what are called gooseberry bottles, and can be procured in places where the latter cannot be had. The bottles must be filled as full as they can be packed, and corks being stuck lightly into them, they are to be placed upright in a kettle of water, and heated gradually to about 160 or 170° Fahr.; that is to say, until the water feels very hot to the finger, but does not scald. This degree of heat is to be kept up for half an hour, and then the bottles being taken out one by one, they are to be filled up to within an inch of the cork with boiling water, the cork fitted very close and tight, and the bottle laid on its side, that the cork may be kept moist. To prevent fermentation and mould,

* Trans. Soc. Arts, vol. XXVI.

the bottles are to be turned once or twice a week for the first month or two, and one or twice a month afterwards.

When applied to use, some of the liquor first poured off serves to put into the pies, &c. instead of water, and the remainder being boiled up with a little sugar will make a rich and agreeable syrup.

The fruit ought not to be cracked by the heat; some trials were made by keeping the bottles in a heat of 190° for three quarters of an hour, but the fruit was reduced nearly to a pulp.

Although wine or porter bottles have such narrow necks, the fruit may be picked out with a bent wire, or iron skewer.

Samples of apricots, gooseberries, currants, raspberries, cherries, plums, Orleans plums, egg plums, damsons, Siberian crabs, green gages, and rheubarb, have been presented to the society.

In the summer of 1807, it cost about 1*l.* 9*s.* exclusive of the charge of the bottles and corks, to preserve 95 bottles of fruit; which were worth in the winter one shilling each, so that there was a clear gain of 200 per cent.

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Observations. That fruit, if not too ripe, might be preserved by the bottles in which it was packed being heated in a water bath, and then closely stopped, has been long known: but so many minute circumstances were necessary to insure success, that the addition of boiling water must be esteemed a great improvement; and we assure Mr. Saddington that we ourselves mean to put his process into execution this summer,

and have not the least doubt but that our families and guests will frequently give him their thanks in the ensuing winter.

It is expressly said that the bottles should be filled with water to within an inch of the cork: but would it not be better to fill them entirely with water? for what good purpose can be answered by leaving any bubble of air within the bottle, which renders it further necessary to turn the bottle occasionally?

It appears to us also that the water with which the bottles are filled, ought to have boiled strongly for some time, in order to disengage it as much as possible of the air it contained.

[*Lond. Retrospect.*

Account of a simple and economical Method of preparing an artificial Cheltenham Water highly impregnated with Carbonic Acid. By RICHARD GREENE, *Esq. of Cork; A. B. Trin. Col. Dub. M. D. and President of the Royal Medical Society, Edinburgh*.*

The natural Cheltenham waters have been long and deservedly celebrated for their medical uses. Their virtues are chiefly owing to the sulphates of soda and magnesia. They contain also about one-eighth in bulk of carbonic acid, which, in one gallon of the water, holds in solution nearly five grains of iron. The sulphate and carbonate of lime which exist in them seem to have no effect on their medicinal properties.

* Phil. Journ. No. 97.

The carbonic acid used in making artificial mineral waters is procured by treating any of the natural carbonates of lime, as chalk, marble, &c. with diluted sulphuric acid. The gas is then by mechanical pressure forced into the water.

The carbonate of soda and magnesia contain a large quantity of carbonic acid; the former about one-sixth, and the latter nearly half its weight. They are decomposed by sulphuric acid, and the salts of Cheltenham water are formed.

It ocurred to Dr. Greene, that if a sufficient quantity of water were present, and the gas, during its disengagement, could be confined, the effect would be similar to mechanical compression. Many experiments were made on this idea with perfect success.

The volume of carbonic acid which might be confined with safety in a half-pint bottle, was ascertained, and the quantities of the carbonates and diluted sulphuric acid required being known by calculation, the carbonates were put into the bottle with one grain of sulphate of iron, and filled with cold water, except a small space for the sulphuric acid, which being introduced, the bottle was corked and secured with a string. By a little agitation the salts soon dissolved, and the liquor became transparent. The string being untied, the cork was driven out with considerable violence, and the water scarcely differed in taste from the best soda-water.

The materials used in this experiment were nearly one-half greater than Dr. Greene recommends, which shows that the strength of the water may be much increased without bursting the bottles.

The carbonate of soda employed was the common soda of commerce, prepared from muriate of soda by the patent process; it neither deliquesced nor effloresced by exposure to the air, and gave no indication of lead, which it has been supposed to contain, when made in this way.

He prepared the carbonate of magnesia from sea-water, and could depend on its purity.

The sulphuric acid was the diluted acid of the Edinburgh college, of the spec. grav. 1.0735, and was made by adding one part of the acid of commerce, of the spec. grav. 1.852, to eight parts of water.

The following are said to be the best proportions of these substances to half a pint of water:

Carbonate of soda	40 grains troy.
——— of magnesia	20 grains ditto.
Sulphuric acid	250 grains by measure, or a quantity equal in bulk to 250 grains of water.

In this case there is a slight deficiency of sulphuric acid, which should always be observed, for the excess of carbonic acid will dissolve any carbonate of magnesia that may remain; but an excess of sulphuric acid gives the water a disagreeable taste, and might injure the teeth, and affect the bowels, if irritable.

These quantities produce about 35 cubic inches of gas, which in a half-pint bottle is equal to the additional pressure of an atmosphere and half on the sides of the bottle, or of two atmospheres and half on the surface of the water.

The sulphuric acid employed should be diluted: in this case, if any lead be present, it will be precipitated.

The quantities here specified may not always exactly answer, as the carbonate of soda is not uniform in its composition, nor the acid always of the same strength; any excess, however, will be apparent, by an acid taste in the water after it has been exposed to the air for some time; and any considerable deficiency, by a part of the magnesia remaining undissolved. In either case the acid must be increased or diminished as indicated.

To ascertain the exact quantity of acid necessary to a given weight of the carbonates, add about an ounce of water in a wine-glass, introduce the acid gradually, and stir the mixture till they are dissolved, and no effervescence appears, taking care that the acid is not used in excess, which is known by its changing infusion of litmus or red cabbage-leaves to red. Note exactly the quantity of acid used, and make a measure containing ten grains less, which is easily done by a glass tube and a file. If this succeed well, a quantity of the same may be procured and kept in close vessels.

The bottles to be used should be previously furnished with corks, that no time may be lost after the acid is introduced; and they should remain on their sides, that no gas may escape. The magnesia should be in fine powder, to dissolve more readily. The soda should not be so, as by its slow solution the magnesia will meet the acid in a more active state. By observing these precautions, a bottle of the water may be made ready for use in less than a minute. It will keep well: shake the bottle before it is opened, as the iron precipitates in part.

The strength of the water may be easily varied by altering the quantities of the materials, observing the relative proportion of the acid to the carbonates.

For a pint bottle, the quantities are,

Carbonate of soda	80 grains.
——— of magnesia	40 ditto.
Sulphuret of iron	2 ditto.

This is a full dose for an adult, and more than should be taken for a constancy during a course of this water. The expence of preparing a pint botttle is only about one penny.

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Observations. This appears to be a simple and economical method of obtaining artificial Cheltenham water, and it will probably be connected with general utility.

We have some doubts whether this idea is original, though we by no means wish to detract from the merits of Dr. Greene, to whose experiments the public will be much indebted for a ready and a cheap supply of this water.

Lond. Retrospect.

On the Chinese Method of propagating Fruit-trees by Abscission. By Dr. James Howison*.

It is stated that the Chinese do not raise fruit-trees from seeds or grafts, as is customary in Europe, but in the following

* Trans. Soc. Arts, Vol. XXV.

method: they select a tree which they wish to propagate, and fix upon a branch which will disfigure it the least by the removal; and round this, as near as conveniently may be to its junction with the trunk, they wind a rope made of straw besmeared with cowdung, until a ball is formed five or six times the diameter of the branch. This is intended as a bed into which young roots may shoot; and immediately under the ball the bark i divided down to the wood for nearly two-thirds of the circumference of the branch: a cocoa-nut shell, or small pot, is then hung over the ball with a hole in the bottom, so small that water put therein will only fall in drops, by which means the rope is constantly kept moist; a circumstance necessary for the ready admission of the young roots, and for the supply of nourishment for the branch. When the vessel has been supplied with water for three weeks, one-third of the remaining bark is cut, and the former incision carried deeper into the branch, as by this time some roots have struck into the rope, and assist in giving support. After a similar interval, the operation is again repeated, and in about two months from the commencement of the process, the roots are generally seen intersecting each other on the surface of the ball; which indicates that they are sufficiently advanced to admit of the separation of the branch from the tree; and this is best done by sawing it off at the incision, taking care that the rope, which must have become nearly rotten, is not shaken off by the operation; and then the branch is planted as a young tree.

It is conceived that a longer period would be necessary to succeed with this operation in Europe, because vegetation is so much slower here than in India, where Dr. Howison made his experiments; but he thinks that an additional month would be adequate to make up for the deficiency of climate.

The advantages of this method are stated to be, that a farther growth of three or four years is sufficient, when the branches are of any considerable size, to bring them to their full bearing state; whereas eight or ten years would be otherwise necessary: this he saw proved from experiment at Prince of Wales's Island. The writer's experience does not allow him to speak of the success with which this method might be applied to forest trees, but he little doubts of its succeeding, and the adoption of it is recommended at all events in multiplying such plants, natives of warmer climates, whose seeds do not come to maturity in this country. He has besides frequently remarked that such branches of fruit-trees as were under the operation of abscission at the time of bearing, were more laden with fruit than the rest of the tree, which is attributed to a plethora or fulness, occasioned by the communication between the branches and the trunk being cut off by the division of the bark, and has observed that the roots from a branch under this operation were longer in shooting into the ball of straw, when the tree was in leaf, than at another time, on which account he recommends the spring as the best season for making experiments.

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Observations.—This mode of propagating trees, which prevails in many parts of eastern Asia, is deserving the notice of our horticulturists at home; and from the prevailing inclination to pursue that branch of science, we have no doubt of being soon able to communicate experiments of this mode of propagation in our own country.

[*London Retrospect.*

Analysis of the Waters of the Dead Sea, and of the River Jordan. By Dr. ALEXANDER MARCET*.

The Dead Sea derives its name from its intense saltness, which prevents either animals or vegetables from living in it. Although this circumstance has been mentioned by many very ancient authors, the only chemical analysis of its waters is that by Macquer, Lavoisier, and Sage, published in the Mem. de l'Acad. des Sciences for 1778, which is very imperfect.

Mr. Gordon, of Clunie, recently brought from the Dead Sea a phial containing about 1½ oz. from a part of the lake about two miles from the mouth of the Jordan; and another somewhat larger phial of the water of the Jordan. This specimen was brought from a spot about three miles from where the river enters the Dead Sea.

The specific gravity of the water of the Dead Sea is 1.211, so that it has been found that a man may lie motionless in any attitude on its surface, without danger of sinking. It is perfectly transparent, and does not deposit any crystals in close vessels. Its taste is peculiarly bitter, saline, and pungent. It forms copious precipitations in solutions of silver. Oxalic acid throws down oxalate of lime, and this being separated, both caustic and carbonated alkalies readily throw down a magnesian precipitate. Solutions of barytes produce a cloud, which shows the presence of sulphuric acid. Succinate of ammonia does not detect any alumine in it: nor are the infusions of litmus, violet, or turmeric altered in colour. It will take up more common salt.

* Phil. Trans. 1807, part II.

From hence the water appears to contain the muriates of soda, lime, and magnesia, along with sulphate of lime. The composition, therefore, of these salts was examined.

A known measure of muriatic acid was poured upon marble, which had been previously ascertained to contain 56.1 per cent. of lime. The undissolved marble being weighed, and the solution evaporated to dryness, and ignited, the muriate of lime was found to contain 50.77 per cent. of lime, and 49.23 of acid.

A certain measure of muriatic acid sufficient to dissolve a known weight of marble, was added to calcined magnesia, and the excess of acid saturated with marble; and from thence muriate of magnesia, perfectly free from water, was found to contain 43.99 per cent. of magnesia, and 56.01 of acid.

A certain measure of muriatic acid sufficient to dissolve a known weight of marble, was treated with nitrate of silver; and from thence the luna cornea, after being melted, and heated to redness, was found to contain 80.95 per cent. of oxide of silver, and 19.05 of acid. Then nitrate of silver being precipitated by a known weight of common salt, it was found to contain 46 per cent. of acid, and 54 of soda.

In order to estimate the defects and advantages of the different methods which might be adopted for the analysis of the water, they were tried on artificial solutions, containing the three muriates found in the water, but omitting the sulphate of lime.

The first solution was evaporated to dryness, and ignited for an hour in a platina crucible, pretty closely covered. The

residuum was elixiviated with water to separate the magnesia, the lime was precipitated from the ley by carbonate of ammonia, and the common salt obtained by a new evaporation. But the muriate of magnesia was not completely decomposed by the ignition, and therefore this mode of analysis indicates less magnesia, and more lime, than was really in the solution; the estimate of common salt was tolerably accurate.

The lime of the second solution was precipitated by oxalate of ammonia, the muriate of magnesia was decomposed by heat in an open crucible; and the common salt was obtained by elixiviation and evaporation; the estimate of lime and magnesia was accurate, but the common salt was materially reduced by the heat necessary to decompose the muriate of magnesia.

In a third solution, the lime was precipitated by oxalate of ammonia, the magnesia by recent carbonate of ammonia, and the common salt obtained by evaporation and desiccation. But the magnesia was only imperfectly precipitated.

The most successful method was to separate the muriatic acid from part of the solution by nitrate of silver. From another portion the lime was precipitated by oxalate of ammonia, and the magnesia either by caustic potash or by carbonate of ammonia; in which latter case the precipitation is imperfect, and the remainder of the magnesia must be separated by exsiccation, ignition, and subsequent elixiviation. The quantity of common salt was inferred from the remaining quantity of acid, after the portions of acid belonging to the other two muriates had been calculated. This estimate may be corrected by actually obtaining the common salt from one of the portions of the solution. This method was found to be remarkably accurate.

The information thus acquired, was applied to the analysis of the water of the Dead Sea.

Twenty grains of this water, being evaporated at a heat of about 180° Fahr. left 8.2 gr. of an opake white mass, containing crystals of common salt. This mass deliquesced in the air, and being again dried at 212° Fahr. left 7.7 gr. This residuum being exposed for a few minutes to a heat about 15° higher, was reduced to 7.4 grains; and as, on dissolving it in water, a few insoluble white particles appeared, the muriate of magnesia had begun to be decomposed.

A few drops of muriate of barytes, added to 100 gr. of the water of the Dead Sea, let fall 0.1 gr. of sulphate of barytes.

Nitrate of silver, added to 250 gr. of the water, let fall a quantity of luna cornea, which, being edulcorated and slightly ignited, weighed 163.2 gr. A little sal ammoniac was added to the supernatant solution, to separate the excess of silver, which was edulcorated and dried. The clear fluid was evaporated to about 3 oz. and a strong solution of oxalate of ammonia added warm, but not near boiling, lest it should throw down the magnesia. To ascertain the quantity of lime contained in the precipitated oxalate of lime, the oxalic acid was driven off by a low red heat, and a known quantity of muriatic acid, more than sufficient to dissolve the subcarbonate of lime thus produced, was added: the excess of acid was taken away by a piece of marble of a known weight. The quantity of lime in the selenite, according to the calculations of Chenevix, being subtracted, the oxalate of lime, thus precipitated, indicated 4.814 gr. of pure lime, equal to 9.48 gr. of muriate of lime.

The clear solution, which was about 4 oz. was concentrated to between 2 and 3 ounces, during which a white powder was deposited, which, from other experiments, was supposed to be oxalate of magnesia. To the concentrated solution was added carbonate of ammonia, with excess of pure ammonia, which rendered the mixture opake and milky, but, on the next morning, the fluid had become quite transparent, with clusters of pellucid crystals spread over the bottom of the vessel. This salt was, no doubt, an ammoniaco-magnesian carbonate, and was exposed to a gentle heat, to drive off the ammonia; the white impalpable powder, thus left, was treated, and its quantity estimated in a way similar to that which had been employed with the lime.

The supernatant solution, although its transparency was not disturbed by caustic potash, yet, on being evaporated and calcined, it left about $\frac{1}{2}$ gr. of carbonate of magnesia. This being added to the other powder, the whole indicated 11.1 gr. of pure magnesia, equal to 25.25 of muriate of magnesia.

As 12.28 gr. of muriatic acid still remained unemployed, the quantity of common salt was estimated at 26.69 grains.

From thence the water of the Dead Sea appears to contain 3.792 per cent. of muriate of lime, 10.1 of muriate of magnesia, 10.676 of common salt, and 0.054 of sulphate of lime.

Another 150 grains of the water were treated with regard to the lime and magnesia, as in the former analysis, but the acid was not separated by silver, being only calculated from the former estimation. With regard to the common salt, 13.1 gr. of it was actually separated by evaporation, the difference of which from the former statement depends on the necessity of

heating the salt to redness. In this experiment the water appears to contain 3.92 per cent. of muriate of lime, 10.246 of muriate of magnesia, 10.36 of common salt, and 0.054 of sulphate of lime; and this is probably the most accurate statement.

Although the saline contents of the water, when perfectly desiccated, are only about 25 per cent. of the water; yet if the salts be only dessicated at the temperature of 180, they will amount to 41 per cent. The common salt is scarcely at all concerned in this difference; for 100 gr. of it lost only at most half a grain by being heated to redness in a platina crucible.

The water, analysed by Macquer and Lavoisier, had probably suffered evaporation, and the proportion of salts, as found by them, is very different from that stated above; but their mode of operating did not allow of any accuracy in this respect.

The water of the river Jordan was perfectly pellucid, very soft, and had no saline taste: but chemical re-agents produced, especially when the water was concentrated by evaporation, effects analogous to those observed with the water of the Dead Sea.

Five hundred grains, evaporated at 200°, left 0.8 gr. which is only 1-300th part of the solid contents of the water of the Dead Sea. Part of this residuum was not dissolved by distilled water, and it effervesced with acids; thus showing the presence of carbonate of lime. Oxalate of ammonia threw down a precipitate weighing 0.12 gr.; ammonia and phosphoric acid threw down another precipitate, which, when the ammonia was driven off by heat, weighed 0.18 gr. The common

salt could not be separated with any accuracy, but it was probably in nearly the same proportion as in the water of the Dead Sea. Perhaps, therefore, the river Jordan may be the source of the impregnation of the Dead Sea, or the same source of impregnation may be common to both.

Observations.—From the preliminary experiments here recorded, we may learn to estimate the small reliance that can be placed upon the analyses, even of the most skilful chemists, unless they are confirmed by other analyses, made in a different manner, as we have already remarked in several instances.

[*Lond. Retrospect.*

An Obstinate Case of Gonorrhœa successfully treated with Cerussa Acetata.

To the Editors of the Medical and Surgical Spectator.

GENTLEMEN,

Having met with a very obstinate case of gonorrhœa, attended with a most distressing chordee, which resisted the usual antiphlogistic treatment, and anodynes, I determined to give the *cerussa acetata* a trial, as recommended in a former number of your publication. After taking three doses of the medicine, the chordee and ardor urinæ were considerably abated; he had no return of the priapisms during the night, and the following morning he experienced very little pain in evacuating his urine. By continuing this medicine, the symptoms gradually abated, and in three days he was perfectly well, without the use of an injection, or any other remedy. It is worthy of

remark, that, during the exhibition of this medicine, his appetite was improved, and he evidently gained strength. Your recommendation of the medicine having induced me to give it a trial in his case, I think it my duty to communicate to you the result.

I am, gentlemen,

Your obedient servant,

T. M. CATON.

August 26th, 1809.

Sulphur a Compound.

On the 27th of June, 1808, M. Curaudau read before the Imperial Institute of France a memoir, in which he proved that sulphur, hitherto regarded as a simple substance, is composed of carbon and hydrogen, and that they may be separated after having entered into the composition of a destructible body.

[*Journal des Frères Cheinaux.*

Prospectus of a periodical work, to be entitled, The American Mineralogical Journal, conducted by Archibald Bruce, M. D. Professor of Mineralogy in the University of the state of New-York.

The object of this work is to collect and record such information as may serve to elucidate the mineralogy of the United States, than which there is no part of the habitable globe which presents to the mineralogist a richer or more extensive field for investigation.

Of the utility of a publication of this kind, much might be said: it may however be sufficient to observe, that nothing has contributed more to increase and diffuse mineralogical information than the periodical works on the continent of Europe particularly those in Germany and France. At the present period, when such laudable exertions are making to improve and extend the manufactures of our own country, a knowledge of the mineral productions, on which so many of the useful arts depend, and with which nature has so liberally supplied us, becomes particularly desirable.

The mineral combinations which exist here, under forms unknown in Europe, will, we trust, procure for this journal some attention abroad.

In order therefore that the design may be carried into effect, communications from those gentlemen who may have directed their attention to this interesting branch of science, are respectfully solicited, particularly such as may relate to the geology and mineralogy of particular districts; the history of mines, their products, methods of reduction, and improvements in metallurgy generally; descriptions of individual specimens, their constituent principles, localities, and uses to which they may be applied in the arts; mineral waters, their situation, analysis, and use in the arts, and in the cure of diseases, &c. A part of the work will be appropriated to such useful information as may be derived from foreign and domestic journals.

The first number will be published in the beginning of January next.

Communications, post paid, to be directed to Dr. A. Bruce, New-York, or to Messrs. Collins and Perkins, the publishers.

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